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ABSTRACT

This study was part of a project to develop science and technology (STS) issue investigation and action materials with the potential for use across science and social studies classes at the secondary level. Special emphasis was given to learning teachers' perspectives on the development of a unit on the impact of pesticides on society. Seven areas were explored: (1) course context (i.e., in what courses would a unit on pesticides best fit); (2) concept linkages (with broader science and social studies concepts); (3) length of such a unit; (4) instructional technology and media, especially microcomputer technology; (5) interdisciplinary cooperation between teachers; (6) relevance to students and the local community; and (7) teachers' perceived degree of preparation. Questionnaires were mailed to 55 exemplary science and social studies teachers. Useable surveys were received from 25 teachers, representing teacher certification in 32 science fields, 4 social studies fields, and 6 in "other" fields. Overall, the teachers appeared open to the issue investigation and action approach to dealing with STS issues. STS instruction must help learners develop the following capabilities: (1) knowledge of how to seek out information on issues from all sides and weigh it before decisions are made; (2) knowledge of various action skills and a strategy to select among them; and (3) the ability to apply this knowledge in the resolution of an issue--a capability that is developed through guided practice. The questionnaire is attached. (22 references; 6 tables) (KM)

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A STUDY OF THE QUALITIES TEACHERS RECOMMEND IN STS ISSUES INVESTIGATION AND ACTION INSTRUCTIONAL MATERIALS

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A STUDY OF THE QUALITIES TEACHERS RECOMMEND IN STS ISSUES INVESTIGATION AND ACTION INSTRUCTIONAL MATERIALS

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Approximately 2.5 billion pounds of pesticides are used annually in the U.S. (Miller, 1985). These pesticides are applied virtually everywhere -- farms, forests, yards, homes, offices, schools, stores, hospitals -- to increase agricultural productivity and to maintain public health (Ware, 1983). Consequently, people come into contact with pesticides where they live and recreate. The need to make pesticides both environmentally safe and socially acceptable is great. Still, many of the problems associated with pesticides may best be resolved through education rather than through more legislation. More generally, educating the public and empowering citizens with the knowledge, skills and motivation to resolve societal issues associated with science and technology (STS issues) in a responsible manner, may be the best hope for their resolution.

Early in this decade blue-ribbon groups of science and social studies educators acknowledged that it is incumbent upon schools to help students as future citizens become aware of the societal issues associated with areas of science and technology, such as pesticide use, as well as to prepare them to be able to make informed decisions on other STS issues and to act accordingly (e.g., Aaronian and Brinckerhoff, 1980; Harms and Yager, 1981; National Science Teachers Association [NSTA], 1982; National Science Board [NSB], 1983; National Council for the Social Studies [NCSS], 1983). The call for school science and social studies programs to prepare students to deal responsibly with STS issues is reiterated in curriculum statements by the National Science

Teachers Association and the National Council for the Social Studies to be released during 1990.

The Penn State Center for Education in Science, Technology and Society has been working with school districts in Pennsylvania and surrounding states since 1985, offering teacher workshops in STS education, assisting in the development of STS units for integration into science and social studies courses, and examining the effects these activities via research. Those efforts have focused on the use of STS issue investigation and action units developed around a goal structure and complementary set of objectives for STS Education by Rubba and Wiesenmayer (1988).

Studies by Klingler (1980), Ramsey, Hungerford and Tomera (1981), Ramsey (1987), Simpson (1989) and Wiesenmayer and Rubba (1990) have shown issue investigation and action based instruction on STS issues to result in greater participation in actions by students toward the resolution of STS issues than instruction that emphasizes issues awareness and/or science concept formation. Rubba and Wiesenmayer (1990), in fact, report that students' science concept understanding also can be enhanced via STS issues investigation and action instruction. Issues investigation and action instruction was proposed for use as an environmental education model by Hungerford, Peyton and Wilke (1980) and later validated in studies by Sia, Hungerford and Tomera (1986) and Hines, Hungerford and Tomera (1987).

STS issue investigation and action instruction organized around the goal structure provided by Rubba and Wiesenmayer (1988) is, in essence, a project approach. A unit may begin with activities in which students examine the nature of science and technology, and characteristic interactions among science, technology and society. Next, critical STS issues may be identified,

and analyzed to identify what makes them issues, for relevant science and social science concepts, and to identify the prominent value positions of the various sides of the issue. Case studies might be used to demonstrate that only through responsible citizenship action is there a possibility for STS issues to be resolved and that we can have an impact.

A community and student relevant STS issue may then be selected by the class or a number of issues may be selected by groups of students within a class, to focus upon in the investigation and action activities. Students learn issue investigation skills as they apply them to an issue. These might include, the study of science and/or social science concepts, library research, securing data and information from governmental and private agencies, the collection of natural science data on sight, and use of questionnaires and opinionnaires within the community to collect data. The information that is collected is analyzed by the students and used to propose alternative solutions to the STS issue. The pros and cons of each resolution strategy are weighed and a course(s) of action decided upon. Lastly, students carry through with the action plans they helped compose, as members of a group or individually, and evaluate the effects.

Purpose

The study reported on here was part of a project to develop STS issue investigation and action instructional materials on pesticides and society with the potential for use across science and social studies classes at the secondary level. The study was undertaken to secure input from potential users, secondary science and social studies teachers, on the qualities they would recommend be included in STS instructional materials on pesticides -- a

market survey of a type. Teachers' knowledge, skills and opinions are critical factors in the implementation of curricula (Aikenhead, 1984). Mitchener and Anderson (1989) identified five areas of science teacher concern that were crucial in the implementation of an exemplary STS curriculum by teachers in a high school.

Herein, input was desired from teachers who were potential users of STS instructional materials on pesticides and soceity in seven areas:

1. Course Context -- science and social studies courses in which teachers would consider using pesticides and society instructional materials;
2. Concept Linkages -- science and social studies concepts that teachers believe could be taught within the context of pesticides and society instructional materials;
3. Length -- the maximum number of school days/class periods teachers could dedicate to pesticides and society instructional materials;
4. Instructional Technology and Media -- the degree to which microcomputer technology and more traditional forms of media could be utilized in pesticides and society instructional materials;
5. Interdisciplinary Cooperation -- the degree to which science and social studies teachers could teach pesticides and society instructional materials in a coordinated manner;
6. Relevance -- factors that would make pesticides and society instructional materials relevant to the local community and its students;
7. Teacher Background -- the teachers' perceived degree of preparation to teach pesticides and society instructional materials.

Procedures

The target population from which input was desired for the survey included exemplary science and social studies teachers from across the nation. The accessible population, the subset of the target population to which the researchers had access, included the contact people for the 1988 National Science Teachers Association (NSTA) Exemplary Programs, and colleagues of these individuals in science and social studies.

As it had six years earlier, in 1988 the NSTA recognized exemplary school science programs in 11 areas: biology, chemistry, earth science, elementary school science, energy education, use of inquiry in science, middle school science, non-school science, physical science, physics, and STS. A letter of inquiry was sent to the 83 contact people for exemplary programs* in nine of the areas -- all but elementary school science and non-school science -- in early March. (The elementary list was not used given that five of the grades, K through 4, are typically not included in middle schools. Non-school science was not relevant to the intended use of the STS unit.)

The inquiry letter requested participation by the contact person as well as science and social studies colleagues of that individual in a market type survey on pesticides and society instructional materials. Enclosed with the letter was a return postcard on which the contact person was to list the names and addresses of science teachers and social studies teachers who might volunteer to participate. The 55 teachers whose names were volunteered by the contact person became the sample for the survey.

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* The help of Dr. Robert Yager, Professor of Science Education at the University of Iowa, is gratefully acknowledged in securing this information.

In early April the questionnaire that appears in the appendix was sent to each of the sample members along with an explanatory cover letter and a business reply envelope. The eight section questionnaire was developed specifically for the purposes of the survey by the researchers. The first section collected demographic information on the respondents, and the other seven sections assessed the seven areas listed in the Purpose section, above. The last seven sections were content validated by a panel of three science educators (a faculty member and two doctoral students) against the seven areas teacher input was desired upon. The reliability of the questionnaire was not established given the few number of items used in each section and the differing item types used.

Results

Twenty-eight of the sample members returned the questionnaire by the end of April (one week past the two week deadline) for a 51 percent return rate. Given a large number of the 55 sample members may have unknowingly been volunteered by the contact person for an NSTA Exemplary Program and only one contact was made with the sample members, the return rates were accepted. Twenty-five of the questionnaires were analyzed; three questionnaires were not analyzed because the respondents were full-time administrators.

The Respondents

Demographic information from Section I of the questionnaire on the 25 respondents are displayed in Tables I through IV. This information included the respondents' educational backgrounds, areas of teacher certification, years of teaching experience, and courses presently taught, respectively.

TABLE I
Respondents' Educational Background

Level	f
Bachelor's Degree	1
Bachelor's Degree + 15 sem. hrs.	3
Masters Degree	6
Masters Degree + 15 sem. hrs.	2
Masters Degree + 30 sem. hrs.	2
Masters Degree + 45 sem. hrs.	9
Doctorate	2

TABLE II
Respondents' Areas of Teacher Certification

Area	f*
Biology	13
Earth Science	10
Chemistry	8
Social Studies	4
General Science	3
Physics	2
Other	6

* Add to more than 25 because of multiple responses

TABLE III
Respondents' Years of Teaching Experience

n	M	SD	Min	Max
Total				
25	18	9.7	2	35
Elementary Level				
1	2	0	0	2
Middle/Junior High School Level				
19	11	9.4	1	29
High School Level				
20	13	10.8	1	35

TABLE IV
Courses Presently Taught by Respondents

Course	f*
Middle/Junior High School Courses	
General Science	1
Life Science	2
Earth Science	1
Physical Science	4
High School Courses	
Physical Science	2
Earth Science/Geology	5
Biology I	8
Chemistry I	7
Physics	2
Biology II	2
Chemistry II	3
STS	2
Social Studies/History	2
Other Science	3

* Add to more than 25 because of multiple responses

Eighty-four percent (21) of the 25 respondents held a masters degree or above. The major areas of science and social studies certification were represented among the sample. In addition, certification to teach at the elementary level, health, math, psychology and special education were each listed by one respondent under the "other" category (Table II), and one individual held a principal's certificate. Sixty-eight percent (17) were certified in two areas, and 20 percent (5) in three areas.

Most of the respondents had teaching experience at multiple levels. Seven had experience as science or social studies department chairpersons, three had experience as district science or social studies coordinators, and one as an assistant principal. The respondents present teaching assignments covered the spectrum of middle/junior high school and high school science and

social studies courses. In addition, four were-part time curriculum coordinators or administrators (assistant principals).

Findings

Data secured from the 25 respondents via the questionnaire on qualities they would recommend be included in STS instructional materials on pesticides are summarized below under the seven respective categories.

Course Context

In response to the items in Section II of the questionnaire, the respondents noted that they would consider using pesticides and society instructional materials in every science and social studies course they were responsible for teaching, i.e., those listed in Table IV. Included in the "other science" course label in Table IV the respondents noted biochemistry, nutrition, and environmental studies.

Concept Linkages

While many of the respondents listed broad topics as opposed to specific concepts in response to the items in Section III of the questionnaire, an average of six entries were made by the respondents. The life science linkages the respondents suggested centered on ecology (e.g., interrelationships and interdependence, food chain/web, biomagnification, life cycles), physiology (e.g., cell physiology, toxin solubility) and genetics (e.g., mutation, adaptation). The earth science linkages were associated with soil and water, including ground water, streams, bays and the ocean. The physical science linkages were mostly from organic chemistry and biochemistry, including the chemistry of toxins, rates of reaction and decomposition, solubility, catalysts and reaction inhibitors. Linkages with social studies

included social and political values, public policy, supply and demand, trade-offs, power, social participation, the nature of evidence, economics, and ethics.

The 23 science teachers among the sample listed linkages with topics not usually dealt with in life, earth and physical science courses. These included the economics of pesticides, environmental vs. business cost/risk analysis, long-term prediction, consumer safety, STS interactions, and decision making.

Length

The average number of school days/class periods the respondents indicated in Section IV of the questionnaire that they could dedicate to pesticides and society instructional materials was 15. With a standard deviation of 7.6 days, 68 percent of the respondents fell in the seven to 23 day period. The minimum number of days listed was 5 and the maximum was 35.

Instructional Technology and Media

Section V of the questionnaire contained 13 items that inquired about the degree to which the respondents had access to microcomputer technology and more traditional forms of media so inferences could be made concerning the degree to which these could be utilized in pesticides and society instructional materials. Fifty-six percent (14) of the respondents noted that they had access to a microcomputer lab on an "as needed" basis. Seventy-two percent (18) indicated that they could arrange to have four or five microcomputers brought into their classroom for use on an "as needed" basis. Forty-four percent (11) of the respondents had at least one microcomputer in their classroom on a full-time basis and 12 percent (3) had two. Only 20 percent (5) of the respondents had ready access to a modem, however. The

respondents reported that 96 percent of the microcomputers they had access to were Apple brand, either Apple IIe, IIc or IIgs, with the other four percent being IBMs, TRS-80s and and PETs.

Table V presents the percentages of respondents who indicated that they had "as needed" access to other forms of technology and media to support instruction.

TABLE V
Respondents' Access to Technology and Media

Item	% having "as needed" access
Video-disk player and monitor	36
VHS video player and monitor	80
16mm film projector and screen	96
Film and video source	24
Overhead projector	96
School library for students	96
Transportation for field-trips	33
Community resource people	70

The responses to other items in Section V of the questionnaire add to those in Table V. Seventy-six percent (19) of the respondents noted that they were limited in their use of videos and film by budget constraints and/or ordering procedures. Similarly, for 68 percent (17) of the respondents access to field-trip transportation was restricted. Among these restriction were: 1) budget limitations that would not allow for field trips (35%), 2) an encumbered approval process (17%), 3) students having to pay for the transportation (8%), 3) only being able to take field trips after school (4%), and 4) on class period time limits on field trips (4%). Twelve percent (3) of the respondents indicated that they were not aware of the availability of community resource people on STS issues. The 23 science teachers among the respondents gave their science laboratory facilities an average quality rating of 4 on the scale, "None: 1 2 3 4 5 :Excellent."

Interdisciplinary Cooperation

When asked about the possibility of interdisciplinary cooperation across science and social studies courses on pesticides and society instructional materials, 76 percent (19) of the respondents answered in the affirmative. Among those who responded "Yes," ten was the mean number of class period/days it was anticipated a cooperative effort could be sustained, with a standard deviation of 8.9.

Twenty percent (5) of the respondents indicated that interdisciplinary cooperation had been carried out between science and another subject(s) (e.g., English, math, social studies) in the recent past. An additional eight percent (2) indicated that their school was moving towards establishing a more interdisciplinary curriculum. Good relations among the faculty and relations between faculty and adminstistration were cited by 36 percent (9) of the

respondents as a primary factor that would allow science and social studies cooperation. Individual student schedules were cited most frequently as the major inhibitor to interdisciplinary cooperation.

Relevance

On average each respondent noted three factors that would make pesticides and society instructional materials relevant to their local community and its students. These ranged from general references to food consumption; use of household, yard and garden agents; farming and ranching in the area; and pesticide manufacturing in the community; to notation of specific problems being faced by the community. These problems included, well, stream and large water body pollution from pesticide use, improper disposal of pesticides in landfills, instances of biomagnification of pesticides in food chains, and Alar use in local apple orchards.

Teacher Background

Section VIII of the questionnaire contained nine items on which the respondents could self-assess their background in areas relevant to teaching pesticides and society materials. This was done by circling a number on the scale, "No Background: 1 2 3 4 5 :Well Prepared. Table VI summarizes the data by showing means and standard deviations for the items.

TABLE V

Respondents' Self-Assessment of Background

Item	M	SD
Awareness of pesticide related STS issues	3.4	0.9
An understanding of the various sides/positions associated with pesticide related STS issues	3.2	0.8
Science concepts associated with pesticides (e.g., how they work, their stability)	3.0	0.9
Social studies concepts associated with pesticides (e.g., economics, regulation, policy)	2.4	1.1
Pesticide relevant technology (e.g., manufacture, delivery, application, safety, disposal)	2.6	0.9
Pesticide relevant interactions among science, technology and society	2.9	1.0
The skills to personally take action on STS issues	2.9	1.4
STS issue action experience -- a record of action taking on STS issues	2.4	1.5
Experience in using a wide variety of instructional strategies effectively -- other than the lecture with recitation (e.g., project approach, discussion techniques, simulations)	4.4	0.8

Overall, the respondents indicated that they believed themselves moderately prepared to teach pesticides and society instructional materials. Still, they admitted to weaknesses in their background with the social studies

concepts and technology associated with pesticides and society. The two respondents who were active social studies teachers rated their understanding of pesticides related science concepts at 2.0 and their understanding of related social studies concepts at 4.5. The rating on these items were reversed for the 23 active science teachers -- 3.1 and 2.2. The total group of respondents reported weak records related to taking action on STS issues, but indicated that they had experience using a wide variety of instructional strategies of the types that might be used in STS education.

Discussion

The generalizability of the findings from this study must be weighed against the representativeness of the sample. The limitations of the sample used in this study mandate replication of the study. Still, a number of inferences can be drawn from the data collected from the sample that have implications for the development of STS issue investigation and action instructional materials on pesticides and society, and for the development of STS instructional materials in general.

The science and social studies teachers appeared eager to cooperatively integrate an issue investigation and action unit on pesticides and society of approximately three weeks duration into the courses they teach. The teachers appeared to believe that such an STS unit would allow them to expand the coverage they presently provide to topics in the science and social studies courses, by facilitating the introduction of issue related science, technology and societal aspects not presently covered, as well as add points of practical relevance from the local community.

Interdisciplinary cooperation across science and social studies courses on a pesticides and society unit for as many as 10 days appeared to be possible in schools where individualized student scheduling is not used. In fact, it appeared that the teachers would encourage interdisciplinary cooperation across science and social studies on an STS unit because the did not feel confident about dealing with concepts from the other discipline that are foundational to pesticides issues.

The vast majority of teachers had easy access to microcomputers and to equipment that would allow use of film, video, and overhead media in STS units. Similarly, use of the school library and community resource people appears feasible. Still, it would appear best if microcomputer software and media resources that are integral to an STS unit be made part of the unit to insure they will be available for use; otherwise, school media budgets may restrict their availability.

Neither the science nor social studies teachers indicated that they were well-prepared to teach an STS unit on pesticides, in terms of awareness and understanding of pesticides related STS issues; understanding the relevant science, technology, and societal concepts; the skills to personally take action; as well as the experience of taking action on an STS issue. Rubba (1989b) infers that teacher participation in actions on STS issues may be a crucial contributor to their helping students develop action capabilities and to their credibility when encouraging students to take actions on STS issues. More generally, it is clear (Aikenhead, 1984; Mitchener and Anderson, 1989) that teachers' perceptions, beliefs and practices can have residual effects that interfere with the implementation of innovative curricula, STS for example. Given the primary role teachers play in the success or failure of

new curricula (Stake and Easley, 1978; Aikenhead, 1984), teacher development must be an integral component in the development and implementation of STS materials.

Overall, the teachers appeared open to the issue investigation and action approach to dealing with STS issues, such as pesticides use. Following the goals for STS education presented by Rubba and Wiesenmayer (1988) the objectives for a pesticides and society issue investigation and action the unit would be:

- o to increase learners' understanding of the interrelationships that exist among science, technology and society, including natural science and social science concepts, as exemplified by pesticide use;
- o to make learners aware of the STS issues related to pesticides;
- o to provide learners with opportunities to design and carry-out natural and social science investigations on pesticide related STS issues; and
- o to help learners identify and take actions in a responsible manner on pesticide related STS issues.

In their pursuit of food and shelter, humans have battled pests since the dawn of civilization. The development of pesticides in various forms over time has given us some degree of freedom from pests. As with any form of technology, however, there have been costs/risks associated with the use of pesticides. In many instances the environment and people have suffered as a result of pesticide use.

The development of pesticides, their approval, regulation, manufacture and transportation, use and application, and disposal all are value laden decisions that involve scientific, technological, societal and environmental costs and benefits. In a democratic society, citizens have the right to participate in the resolution of STS issues. In fact, it can be argued that citizens have an obligation to participate in the resolution of science and technology-related societal issues, such as those associated with pesticides.

The multitude of science and technology-related societal issues facing humankind today, in areas such as environmental quality, health and medicine, national security, waste management, and world poluation, suggests changes in the school curriculum. Resolution of issues such as acid rain, nuclear proliferation, and waste disposal, require a scientifically and technologically literate citizenry armed with the knowledge, skills and willingness to pursue issues and take action. The National Science Teachers Association (1982) and the National Council for the Social Studies (1983), in particular, recommend that STS be integrated into the school science and social studies in order to prepare future citizens for life in a society in which decisions on STS issues are an everyday affair. Schools have been somewhat slow to react, however. Yes, one finds more STS in the school curriculum, especially science, than was present early in the decade. But it appears to be limited mainly to teachers noting STS issues in the context of teaching concepts and to discussions with students of their perspectives on issues (Rubba, 1989a).

Providing learners with an awareness of STS issues and an understanding of the science and social studies concepts that underlie them are important components of STS instruction. Still, these are not sufficient for moving one

to take action; the effectiveness of these strategies alone has been brought into question (Ramsey, Hungerford and Tomera, 1981; Wiesenmayer and Rubba, 1990; Rubba, McGuyer and Wahlund, in press).

If STS instruction is to help learners contribute to the resolution of STS issues, it must, in addition, help learners develop three other capabilities (Sia et al., 1986; Hines et al., 1987). The first is knowledge of how to seek out information on issues from all sides and weigh it before decisions are made. Second is knowledge of various action skills that might be applied to an issue and a strategy to select among them. Third is the ability to apply this knowledge in the resolution of an issue, a capability that is developed through guided practice in issue resolution. That practice also contributes to the efficacy perception of learners and increases the probability that they will continue to act on issues. Each of these components, from foundational concepts through action experience, are part of STS issue investigation and action instruction.

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APPENDIX

STS PESTICIDES MODULE QUESTIONNAIRE

I. THE RESPONDENT: Please PRINT your name here _____

a. Teacher Certification (check one and specify discipline and grade)

	Discipline(s)	Grade(s)
___ science(s)	_____	_____
___ social studies	_____	_____
___ other	_____	_____

b. Years of teaching experience (enter number of years)

___ total years of teaching experience, including this year

This includes:

___ years at elementary level
___ years at middle/junior high school level
___ years at high school level

c. My last year in the classroom was the school year 19___ - 19 ___

d. Administrative experience (enter number of years and title)

___ years as (title) _____

___ years as (title) _____

___ years as (title) _____

e. My last year as an administrator was 19___ - 19___

f. Describe your present teaching assignment in terms of...

Subjects Taught	Grade(s)	No. of Sections
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

g. Education (check highest completed)

___ Bachelor's
___ Bachelor's +15
___ Masters
___ Masters +15
___ Masters +30
___ Masters +45
___ Doctorate

II. COURSE CONTEXT: We would like to structure the STS pesticides module so that it can be used across a number of courses and grade levels.

Please list the science or social studies course(s) that you teach in which you would consider using an STS module on pesticides. Also note the grade level(s) and type of students in each course.

Course Title	Grade(s)	Students A = Academic NA = Nonacademic
1._____	_____	A NA Both
2._____	_____	A NA Both
3._____	_____	A NA Both
4._____	_____	A NA Both

III. CONCEPT LINKAGES: Our research shows that science and social studies concepts can be taught effectively within the context of an STS module. In the pesticides STS module we intend to help students develop appropriate science and social studies concepts that are related to pesticide STS issues.

Please list below science or social studies concepts covered in the courses you listed in Section II, above, that you believe could be taught within an STS module on pesticides.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

IV. MODULE LENGTH: We have been helping teachers develop STS modules that occupy 20 to 25 school days.

Please list the maximum number of school days you believe you could dedicate to an STS module on pesticides within each of the courses you listed in Section II, above.

Course 1 (as listed in Section II, above), _____ school days

Course 2 (as listed in Section II, above), _____ school days

Course 3 (as listed in Section II, above), _____ school days

Course 4 (as listed in Section II, above), _____ school days

V. ACCESS TO MEDIA: The major portion of the STS module will be paper and pencil. However, we would like to consider using other media to the degree they do not severely restrict use of the module.

Please describe the degree to which you have access to the following media for instructional purposes during science or social studies classes you listed in Section II. above, by completing EACH of the phrases:

I HAVE ACCESS TO. . .

a. a computer lab containing _____(number of) microcomputers under the following conditions/restrictions:

_____

(What brand and model are the microcomputers?_____

b. _____(number of) microcomputers that can be brought into my classroom for up to _____ days under the following conditions/restrictions:

_____

(What brand and model are the microcomputers?_____

c. ____(number of) microcomputers that are always in my classroom

(What brand and model are the microcomputers?_____

d. a microcomputer with a modem under the following conditions/restrictions

_____

e. a video-disk player and monitor under the following conditions/restrictions:

_____

f. a 1/2 inch vhs videotape player and monitor under the following conditions/restrictions:

_____

g. a 16mm film projector and screen under the following conditions/restrictions:

_____

h. rental films/videos under the following conditions/restrictions:

_____

i. an overhead projector and screen under the following conditions/restrictions:

_____

j. the school library -- for popular news magazines and newsapapers -- under the following conditions/restrictions:

_____

k. transportation for field-trips within the community under the following conditions:

_____

l. community resource people for in-class presentations under the following conditions/restrictions:

_____

m. SCIENCE TEACHERS ONLY -- Please describe the <u>science lab facilities</u> to which you have access for the courses you listed in Section II by circling a number.

Course 1:	None	1	2	3	4	5	Excellent
Course 2:	None	1	2	3	4	5	Excellent
Course 3:	None	1	2	3	4	5	Excellent
Course 4:	None	1	2	3	4	5	Excellent

VI. INTERDISCIPLINARY COOPERATION: Given that STS issues have roots in science and social studies, cooperation across the two areas, though not absolutely necessary, would improve the quality of STS instruction.

Please describe the degree to which the activities in science and social studies courses can be coordinated in your school so that different portions of an STS module, (e.g., on pesticides) can be completed by students in both courses.

___ YES, coordination would be possible for up to ____ days. (I base this judgement upon)

_____

_____

___ NO, it would not be possible (please explain why)

_____

_____

VII. LOCAL RELEVANCE: STS issue relevance to a community and to students are important factors in the success of STS instruction.

List factors that you believe make an STS module on pesticides relevant to your community and its school students: for example, existence of a pesticide manufacturing plant, farming in the area, food consumption in general, safe use of household agents that are classified as pesticides, a specific pesticides related STS issue (e.g., pesticide contamination of water or land)

1.

2.

3.

4.

5.

VIII. TEACHER BACKGROUND: The integration of STS into school science and social studies is a relatively new emphasis -- one, for which teachers are not necessarily prepared. Your responses in this section will help determine the content of the teachers materials that will accompany the STS pesticides module.

Please assess your background in each of the following areas associated with teaching an STS module on pesticides. Use the following scale.

No Background 1 2 3 4 5 Well Prepared

Circle your responses. Add comments under each item as you desire.

a. Awareness of pesticide related STS issues 1 2 3 4 5

b. An understanding of the various sides/positions associated with pesticides related STS issues 1 2 3 4 5

c. Science concepts associated with pesticides (e.g., how they work, their stability) 1 2 3 4 5

d. Social studies concepts associated with pesticides (e.g., economics, regulation, policy) 1 2 3 4 5

e. Pesticide relevant technology (e.g., manufacture, delivery, application, safety, disposal) 1 2 3 4 5

f. Pesticide relevant interactions among science, technology and society 1 2 3 4 5

g. The skills to personally take action on STS issues 1 2 3 4 5

h. STS issue action experience -- a record of action taking on STS issues 1 2 3 4 5

i. Experience in using a wide variety of instructional strategies effectively -- other than the lecture with recitation (e.g., project approach, discussion techniques, simulations) 1 2 3 4 5

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

Please use the business reply envelope to return it.